



Dkt. 66307/JPW/PT/JRM

CHC

Patentee : Wen Dong Song et al.
U.S. Patent No.: 6,838,637 B2
Issued : January 4, 2005
For : METHOD AND APPARATUS FOR DEFLASHING OF
INTEGRATED CIRCUIT PACKAGES
Serial No. : 10/059,940
Filed : January 29, 2002

1185 Avenue of the Americas
New York, New York 10036
June 6, 2006

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Certificate
JUN 14 2006

Attention: Certificate of Correction Branch of Correction

Sir:

REQUEST FOR CERTIFICATE OF CORRECTION UNDER 37 C.F.R. §1.323

Patentee encloses herewith one (1) original and one (1) copy of Patent Office Form PTO/SB/44 (Form PTO-1050) indicating errors in the above-identified subject patent, attached hereto as **Exhibit A.**

The error being corrected on Form PTO-1050 is as follows:

1. The following should be added to the patent and should read -

-- (30) **Priority Application Priority Data**

Oct. 1, 2001 (SG) 200106032-6 --

06/12/2006 RMEBRAH1 00000146 6838637

01 FC:1811

100.00 OP

JUN 15 2006

Patentee : Wen Dong Song et al.
U.S. Patent No. : 6,838,637 B2
Issued : January 4, 2005
Page 2

Patentee respectfully requests that a Certificate of Correction under 37 C.F.R. §1.323 and 35 U.S.C. §255 which provides for the correction of a "mistake of a clerical or typographical nature, or of minor character, which was not the fault of the Patent and Trademark Office" be issued for the subject patent. The correction does not involve such changes in the patent as would constitute new matter or would require reexamination.

The above-mentioned mistake occurred in good faith. The relevant facts and circumstances are discussed infra.

Upon identification of the above-mentioned error in the patent, Patentee conducted an investigation of the cause of the error. As a result of the investigation, it became apparent that Patentee's claim for priority of Singapore Patent Application No. 200106032-6, filed October 1, 2001 (the "Priority Application") was not indicated on the subject patent because the certified copy of the Priority Application submitted by Patentee on May 21, 2002 was not associated with the Patent Office file for the above-identified U.S. patent application. Patentee also determined that the certified copy of the Priority Application was not associated with the Patent Office file for this application because the transmittal letter accompanying the certified copy of the Priority Application incorrectly listed the application Serial Number as "10/059,941" instead of "10/059,940", as a result of a clerical error. A copy of the transmittal letter filed with the Patent Office on May 21, 2002 is attached hereto as Exhibit B. It was confirmed through the public Patent Application Information Retrieval (PAIR) system that the transmittal letter and certified copy of the Priority Application filed by Patentee with the Patent Office on May 21, 2002 was received by the Patent Office and entered in the file of

Printed: 2006

Patentee : Wen Dong Song et al.
U.S. Patent No. : 6,838,637 B2
Issued : January 4, 2005
Page 3

application Serial No. 10/059,941. A computer printout of a listing of the contents of the file wrapper of application Serial No. 10/059,941 is attached hereto as Exhibit C that includes, amongst other entries, "Foreign Priority Papers Filed" containing 23 pages and associated with a Mail Room Date of "06-03-2002". A copy of the 23 page "Foreign Priority Papers Filed" associated with the "06-03-2002" Mail Room Date which was downloaded from the PAIR database of the file wrapper for application Serial No. 10/059,941 is attached hereto as Exhibit D.

Accordingly, Patentee respectfully submits that Patentee submitted on May 21, 2002, and the Patent Office received, the required certified copy of the Priority Application, and that the incorrect listing of the application Serial Number on the transmittal letter submitted along with the certified copy of the Priority Application on May 21, 2002 was the result of a clerical error which occurred in good faith.

No fee other than the enclosed fee of \$100.00 is required under 37 C.F.R. §1.20(a) for this Request Under 37 C.F.R. §1.323. Accordingly, patentee respectfully requests that a Certificate of Correction under 37 C.F.R. §1.323 be issued in accordance with the attached Form PTO/SB/44 (PTO-1050).

15 2006

Patentee : Wen Dong Song et al.
U.S. Patent No. : 6,838,637 B2
Issued : January 4, 2005
Page 4

If the Request for Certificate of Correction on the basis discussed supra is denied, Patentee requests that the following be treated as a Petition to Accept an Unintentionally Delayed Claim for Priority Under 37 U.S.C. 119(a)-(d) or 365(a) Pursuant to 37 C.F.R. §1.55(c), and pursuant to 37 C.F.R. §1.55(c)(2), Patentee authorizes the Patent Office to charge the \$1,370.00 fee required under 37 C.F.R. §1.17(t) for the Petition to Accept an Unintentionally Delayed Claim for Priority, to Deposit Account No. 03-3125.

The discussion of relevant facts and circumstances supra is incorporated in its entirety in the following discussion in connection with the Petition.

37 C.F.R. §1.55(c) provides that:

If a claim for priority under 35 U.S.C. 119(a)-(d) or 365(a) is presented after the time period provided by paragraph (a) of this section, the claim may be accepted if the claim identifying the prior foreign application by specifying its application number, country (or intellectual property authority), and the day, month, and year of its filing was unintentionally delayed. A petition to accept a delayed claim for priority under 35 U.S.C. 119(a)-(d) or 365(a) must be accompanied by:

- (1) The claim under 35 U.S.C. 119(a)-(d) or 365(a) and this section to the prior foreign application, unless previously submitted;
- (2) The surcharge set forth in § 1.17(t); and
- (3) A statement that the entire delay between the date the claim was due under paragraph (a)(1) of this section and the date the claim was filed was unintentional.

Patentee : Wen Dong Song et al.
U.S. Patent No. : 6,838,637 B2
Issued : January 4, 2005
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Pursuant to 37 C.F.R. §1.55(c)(1), Patentee provides the following showing of the claim of priority under 35 U.S.C. 119(a)-(d) or 365(a) and 37 C.F.R. §1.55.

On April 11, 2006 Patentee became aware that the subject patent did not indicate a claim for priority of the Priority Application. Prior to April 11, 2006, Patentee was not aware that the subject patent does not indicate a claim for priority of the Priority Application. Promptly upon learning that the subject patent did not indicate a claim of priority of the Priority Application, and upon learning of the relevant facts and circumstances described supra, Patentee caused this Petition to be prepared and filed. The entire delay between the date the claim was due under 37 C.F.R. §1.55(a)(1) and the date the claim was filed was unintentional as set forth below.

The application from which the subject patent issued was filed on January 29, 2002 under 37 C.F.R. §1.10. The application contained, among other items, an executed Declaration and Power of Attorney, a copy of which is attached hereto as Exhibit E. The executed Declaration and Power of Attorney contained a claim for priority of the Priority Application. Pursuant to 37 C.F.R. §1.55(a)(1)(i), the executed Declaration and Power of Attorney identified the Priority Application by specifying the application number of the Priority Application, the country (or intellectual property authority) in which the Priority Application was filed, and the day, month and year of the filing of the Priority Application. Pursuant to 37 C.F.R. §1.55(a)(1)(i), the claim for priority of the Priority Application was due February 1, 2003. Accordingly, the claim for priority of the Priority Application was timely filed.

APR 5 2006

Patentee : Wen Dong Song et al.
U.S. Patent No. : 6,838,637 B2
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The Filing Receipt mailed February 25, 2002 by the United States Patent and Trademark Office for the application from which the subject patent issued reflects the claim for priority of the Priority Application. A copy of the Filing Receipt attached hereto as Exhibit F.

As discussed supra, the serial number of the application from which the subject patent issued was incorrectly identified on the Transmittal owing to a clerical error that occurred in good faith.

Application Serial No. 10/059,941 is unrelated to the application from which the subject patent issued, application Serial No. 10/059,940. Patentee respectfully submits that Patentee intended to file the Transmittal and the certified copy of the Priority Application in the United States Patent and Trademark Office file for the application from which the subject patent issued, application Serial No. 10/059,940.

Pursuant to 37 C.F.R. §1.55(c)(3), Patentee states, and respectfully submits that the foregoing shows, that the entire delay between the date the claim was due under 37 C.F.R. §1.55(a)(1) and the date the claim was filed was unintentional.

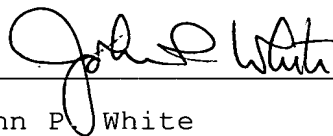
This Petition is being promptly filed after Patentee became aware that the subject patent did not indicate a claim of priority of the Priority Application, given the extent of the investigation that needed to be and was conducted, for its preparation. Accordingly, the undersigned submits that this Petition is being filed promptly after Patentee became aware that the subject patent did not indicate a claim of priority of the Priority Application.

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Patentee : Wen Dong Song et al.
U.S. Patent No. : 6,838,637 B2
Issued : January 4, 2005
Page' 7

If any additional fee is required, authorization is hereby given to charge the amount of any such fee to Deposit Account No. 03-3125.

Respectfully submitted,



John P. White
Registration No. 28,678
Attorney for Patentee
Cooper & Dunham LLP
1185 Avenue of the Americas
New York, New York 10036
(212) 278-0400

I hereby certify that this correspondence is being deposited this date with the U.S. Postal Service with sufficient postage as first class mail in an envelope addressed to:
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Attention: Certificate of Correction Branch



John P. White
Reg. No. 28,678

6/6/06
Date

MAY 5 2006

**UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION**

Page 1 of 1

PATENT NO. : **6,838,637 B2**
APPLICATION NO.: **10/059,940**
ISSUE DATE : **January 4, 2005**
INVENTOR(S) : **Wen Dong Song et al.**

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Title page

The following should be added to the patent and should read -

-- (30) **Foreign Application Priority Data**

Oct. 1, 2001 (SG) 200106032-6---

MAILING ADDRESS OF SENDER (Please do not use customer number below):

**John P. White, Esq., Cooper & Dunham LLP
1185 Avenue of the Americas
New York, NY 10036**

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1.0 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: **Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Patentee : Wen Dong Song et al.
U.S. Patent No. : 6,838,637 B2
Issued : January 4, 2005

Exhibit A

EXHIBIT A

COPY

PTO/SB/44 (04-05)
Approved for use through 04/30/2007. OMB 0651-0033
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.
(Also Form PTO-1050)

UNITED STATES PATENT AND TRADEMARK OFFICE CERTIFICATE OF CORRECTION

Page 1 of 1

PATENT NO. : 6,838,637 B2
APPLICATION NO.: 10/059,940
ISSUE DATE : January 4, 2005
INVENTOR(S) : Wen Dong Song et al.

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Title page

The following should be added to the patent and should read -

-- (30) **Foreign Application Priority Data**

Oct. 1, 2001 (SG) 200106032-6 --

MAILING ADDRESS OF SENDER (Please do not use customer number below):
John P. White, Esq., Cooper & Dunham LLP
1185 Avenue of the Americas
New York, NY 10036

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1.0 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

JAN 15 2006

EXHIBIT B

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants : Wen Dong Song, et al.
Application No. : 10/059,941
Filed : January 29, 2002
For : METHOD AND APPARATUS FOR DEFLASHING OF
INTEGRATED CIRCUIT PACKAGES

1185 Avenue of the Americas
New York, New York 10036
May 21, 2002

Assistant Commissioner for Patents
Washington, D.C. 20231

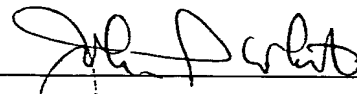
Sir:

TRANSMITTAL OF CERTIFIED COPIES OF EARLIER FILED FOREIGN
APPLICATION AND CLAIM TO PRIORITY PURSUANT TO 35 U.S.C. §119

Applicants submit herewith certified copies of Singapore Patent
Application No. 200106032-6 in Singapore on October 1, 2001, and
cited in Applicant's Declaration pursuant to 37 C.F.R. §1.63.

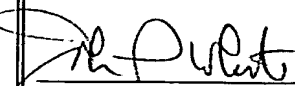
Applicants hereby claim the benefit of the October 3, 2001 filing
date pursuant to 35 U.S.C. §119 and 37 C.F.R. §1.55(a).

Respectfully submitted,



John P. White
Registration No. 28,678
Attorneys for Applicants
Cooper & Dunham LLP
1185 Avenue of the Americas
New York, New York 10036
(212) 278-0400

I hereby certify that this paper is being
deposited this date with the U.S. Postal Service
with sufficient postage as first class mail in
an envelope addressed to: Assistant Commissioner
for Patents, Washington, D.C. 20231.


John P. White
Reg. No. 28,678


Date

Patentee : Wen Dong Song et al.
U.S. Patent No.: 6,838,637 B2
Issued : January 4, 2005

Exhibit B

EXHIBIT C

JUN 15 2006

Printer Friendly

10/059,941 BREATHING SYSTEM AND STRADDLE-TYPE FOUR WHEELED ALL TERRAIN VEHICLE

COMPRISING BREATHING SYSTEM

Image File Wrapper

This application is officially maintained in electronic form. To View: Click the desired Document Description. To Download and Print: Check the desired document(s) and click StartDownload.

| Mail Room Date | Document Description | Page Count |
|----------------|---|------------|
| 06-02-2005 | Miscellaneous Action with SSP | 2 |
| 03-11-2005 | Power of Attorney (may include Associate POA) | 3 |
| 09-15-2004 | Issue Fee Payment Recorded | 3 |
| 07-26-2004 | Notice of Allowance and Fees Due (PTOL-85) | 3 |
| 07-26-2004 | Notice of Allowance and Fees Due (PTOL-85) | 1 |
| 07-26-2004 | Issue Information including classification, examiner, name, claim, renumbering, etc. | 1 |
| 07-26-2004 | Search information including classification, databases and other search related notes | 1 |
| 05-11-2004 | Fee Worksheet (PTO-875) | 1 |
| 04-12-2004 | Amendment - After Non-Final Rejection | 1 |
| 04-12-2004 | Claims | 4 |
| 04-12-2004 | Applicant Arguments/Remarks Made in an Amendment | 2 |
| 04-12-2004 | Transmittal to TC | 1 |
| 01-09-2004 | Non-Final Rejection | 5 |
| 01-09-2004 | List of references cited by examiner | 1 |
| 01-09-2004 | Foreign Reference | 1 |
| 01-09-2004 | Foreign Reference | 13 |
| 01-09-2004 | List of References cited by applicant and considered by examiner | 3 |
| 12-22-2003 | Examiner's search strategy and results | 4 |
| | Information Disclosure Statement (IDS) | |

Patentee : Wen Dong Song et al.
U.S. Patent No. : 6,838,637 B2
Issued : January 4, 2005

Exhibit C

| | | |
|------------|---|----|
| 09-29-2003 | Filed | 2 |
| 09-29-2003 | Foreign Reference | 8 |
| 09-29-2003 | Foreign Reference | 3 |
| 08-04-2003 | Amendment - After Non-Final Rejection | 1 |
| 07-15-2003 | Requirement for Restriction/Election | 5 |
| 06-03-2002 | Foreign Priority Papers Filed | 23 |
| 03-21-2002 | Applicant Response to Pre-Exam Formalities Notice | 2 |
| 03-21-2002 | Oath or Declaration filed | 2 |
| 03-21-2002 | Information Disclosure Statement (IDS) Filed | 1 |
| 03-21-2002 | Foreign Reference | 8 |
| 02-25-2002 | Miscellaneous Action with SSP | 1 |
| 01-28-2002 | Issue Information including classification, examiner, name, claim, renumbering, etc. | 1 |
| 01-28-2002 | Search information including classification, databases and other search related notes | 1 |
| 01-28-2002 | Index of Claims | 1 |
| 01-28-2002 | Transmittal letter | 2 |
| 01-28-2002 | Drawings | 7 |
| 01-28-2002 | Specification | 18 |
| 01-28-2002 | Claims | 4 |
| 01-28-2002 | Abstract | 1 |
| 01-28-2002 | Fee Worksheet (PTO-875) | 1 |
| 01-28-2002 | Fee Worksheet (PTO-875) | 1 |
| 01-28-2002 | Claims Worksheet (PTO-2022) | 1 |
| 01-28-2002 | Foreign Priority Papers Filed | 32 |
| 01-28-2002 | Information Disclosure Statement (IDS) Filed | 1 |
| 01-28-2002 | Foreign Reference | 8 |
| 01-28-2002 | Transmittal letter | 1 |

JUN 15 2006

| | | |
|------------|---------------------------|----|
| 01-28-2002 | Specification | 18 |
| 01-28-2002 | Claims | 4 |
| 01-28-2002 | Abstract | 1 |
| 01-28-2002 | Drawings | 7 |
| 01-28-2002 | Oath or Declaration filed | 1 |

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EXHIBIT D

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JUN 15 2006

Patentee : Wen Dong Song et al.
U.S. Patent No. : 6,838,637 B2
Issued : January 4, 2005

Exhibit D



COPY OF PAPERS
ORIGINALLY FILED

3619

Dkt. 66307/JPW/FHB

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants : Wen Dong Song, et al.
Application No. : 10/059,941
Filed : January 29, 2002
For : METHOD AND APPARATUS FOR DEFLASHING OF
INTEGRATED CIRCUIT PACKAGES

RECEIVED

JUN 06 2002

GROUP 3600

1185 Avenue of the Americas
New York, New York 10036
May 21, 2002

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

TRANSMITTAL OF CERTIFIED COPIES OF EARLIER FILED FOREIGN
APPLICATION AND CLAIM TO PRIORITY PURSUANT TO 35 U.S.C. §119

Applicants submit herewith certified copies of Singapore Patent
Application No. 200106032-6 in Singapore on October 1, 2001, and
cited in Applicant's Declaration pursuant to 37 C.F.R. §1.63.

Applicants hereby claim the benefit of the October 3, 2001 filing
date pursuant to 35 U.S.C. §119 and 37 C.F.R. §1.55(a).

Respectfully submitted,

I hereby certify that this paper is being
deposited this date with the U.S. Postal Service
with sufficient postage as first class mail in
an envelope addressed to: Assistant Commissioner
for Patents, Washington, D.C. 20231.

John P. White
Reg. No. 28,678

Date

John P. White
Registration No. 28,678
Attorneys for Applicants
Cooper & Dunham LLP
1185 Avenue of the Americas
New York, New York 10036
(212) 278-0400

JUN 15 2006



**REGISTRY OF PATENTS
SINGAPORE**

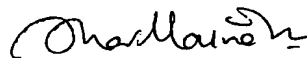
This is to certify that the annexed is a true copy of the following
Singapore patent application as filed in this Registry.

Date of Filing : 1 OCTOBER 2001

Application Number : 200106032-6

Applicant(s) : DATA STORAGE INSITUTE

Title of Invention : METHOD AND APPARATUS FOR
DEFLASHING OF INTERGARTED CIRCUIT
PACKAGES



Sharmaine Wu

Sharmaine Wu Shee Mei
Assistant Registrar
for REGISTRAR OF PATENTS
SINGAPORE

JUN 15 2006

The Registrar of Patents
Registry of Patents01 OCT 2001
200106032-6

REQUEST FOR THE GRANT OF A PATENT

THE GRANT OF A PATENT IS REQUESTED BY THE UNDERSIGNED ON THE BASIS OF
THE PRESENT APPLICATION


| | | |
|----------------------------------|---|---|
| I. Title of Invention | METHOD AND APPARATUS FOR DEFLASHING OF INTEGRATED CIRCUIT PACKAGES | |
| II. Applicant(s) (See note 2) | (a) Name | DATA STORAGE INSTITUTE |
| | Body Description/ Residency | A company limited by guarantee |
| | Street Name & Number | DSI Building, 5 Engineering Drive 1 (off Kent Ridge Crescent, NUS) |
| | City | |
| | State | |
| | Country | Singapore 117608 |
| | (b) Name | |
| | Body Description/ Residency | |
| | Street Name & Number | |
| | City | |
| | State | |
| | Country | |
| | (c) Name | |
| | Body Description/ Residency | |
| | Street Name & Number | |
| | City | |
| | State | |
| | Country | |

WIN 15 2006

01 OCT 2001
200106032-6

| | | | | |
|--|--|--|-------------|--------|
| III. Declaration of Priority (see note 3) | Country/Country Designated | | File No. | |
| | Filing Date | | | |
| | Country/Country Designated | | File No. | |
| | Filing Date | | | |
| | Country/Country Designated | | File No. | |
| | Filing Date | | | |
| IV. Inventors (see note 4) | | | | |
| (a) the applicant(s) is/are the sole/joint inventor(s) | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | | |
| (b) A statement on Patents Form 8 is/will be furnished. | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | | |
| V. Name of Agent (if any) (See note 5) | ALLEN & GLEDHILL | | | |
| VI. Address for Service (See note 6) | Block/Hse No. | 36 | Level No. | 18 |
| | Unit No./PO Box | 01 | Postal Code | 068877 |
| | Street Name | ROBINSON ROAD | | |
| | Building Name | CITY HOUSE | | |
| VII. Claiming an earlier filing date under Section 20(3), 26(6) or 47(4). (See note 7) | Application No. | | | |
| | Filing Date | | | |
| | [Please tick in the relevant space provided]: () Proceeding under rule 27(1)(a). Date on which the earlier application was amended = _____ or () Proceeding under rule 27(1)(b). | | | |

01 OCT 2001
200106032-6

| | | | | | | | | | | | | |
|---|--|--|---|--------|---|--------|---|--------|---|--------|---|--------|
| VIII. Invention has been displayed at an International Exhibition (See note 8) | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | | | | | | | | | | | |
| IX. Section 114 requirements (See note 9) | The invention relates to and/or used a micro-organism deposited for the purposes of disclosure in accordance with Section 114 with a depository authority under the Budapest Treaty <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | | | | | | | | | | | |
| X. Check List (To be filled in by applicant or agent) | A. The application contains the following number of sheet(s):- | | | | | | | | | | | |
| | 1. Request 2. Description 3. Claim(s) 4. Drawing(s) 5. Abstract | <table border="1"> <tr><td>4</td><td>Sheets</td></tr> <tr><td>7</td><td>Sheets</td></tr> <tr><td>3</td><td>Sheets</td></tr> <tr><td>5</td><td>Sheets</td></tr> <tr><td>1</td><td>Sheets</td></tr> </table> | 4 | Sheets | 7 | Sheets | 3 | Sheets | 5 | Sheets | 1 | Sheets |
| | 4 | Sheets | | | | | | | | | | |
| | 7 | Sheets | | | | | | | | | | |
| 3 | Sheets | | | | | | | | | | | |
| 5 | Sheets | | | | | | | | | | | |
| 1 | Sheets | | | | | | | | | | | |
| B. The application as filed is accompanied by:- | | | | | | | | | | | | |
| 1. Priority document 2. Translation of priority document 3. Statement of Inventorship & right to grant 4. International Exhibition certificate | <table border="1"> <tr><td></td></tr> <tr><td></td></tr> <tr><td>X</td></tr> <tr><td></td></tr> </table> | | | X | | | | | | | | |
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| | | | | | | | | | | | | |
| X | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| XI. Signature(s) (See note 10) | Applicant (a) |  | | | | | | | | | | |
| | Date | 1 October 2001 | | | | | | | | | | |
| | Applicant (b) | | | | | | | | | | | |
| | Date | | | | | | | | | | | |
| | Applicant (c) | | | | | | | | | | | |
| | Date | | | | | | | | | | | |

JUN 15 2006

01 OCT 2001
200106032-6

NOTES:

1. This form when completed, should be brought or sent to the Registry of Patents together with the prescribed fee and 3 copies of the description of the invention, and of any drawings.
2. Enter the name and address of each applicant in the spaces provided at paragraph II. Names of individuals should be indicated in full and the surname or family name should be underlined. The names of all partners in a firm must be given in full. The place of residence of each individual should also be furnished in the space provided. Bodies corporate should be designated by their corporate name and country of incorporation and, where appropriate, the state of incorporation within that country should be entered where provided. Where more than 3 applicants are to be named, the names and address of the fourth and any further applicants should be given on a separate sheet attached to this form together with the signature of each of these further applicants.
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4. Where the applicant or applicants is/are the sole inventor or the joint inventors, paragraph IV should be completed by marking the "YES" Box in the declaration (a) and the "NO" Box in the alternative statement (b). Where this is not the case, the "NO" Box in declaration (a) should be marked and a statement will be required to be filed on Patents Form 8.
5. If the applicant has appointed an agent to act on his behalf, the agent's name should be indicated in the spaces available at paragraph V.
6. An address for service in Singapore to which all documents may be sent must be stated at paragraph VI. It is recommended that a telephone number be provided if an agent is not appointed.
7. When an application is made by virtue of section 20(3), 26(6) or 47(4), the appropriate section should be identified at paragraph VII and the number of the earlier application or any patent granted thereon identified. Applicants proceeding under section 26(6) should identify which provision in rule 27 they are proceeding under. If the applicants are proceeding under rule 27(1)(a), they should also indicate the date on which the earlier application was amended.
8. Where the applicant wishes an earlier disclosure of the invention by him at an International Exhibition to be disregarded in accordance with section 14(4)(c), then the "YES" Box at paragraph VIII should be marked. Otherwise the "NO" Box should be marked.
9. Where in disclosing the invention the application refers to one or more micro-organisms deposited with a depository authority under the Budapest Treaty, then the "YES" Box at paragraph IX should be marked. Otherwise, the "NO" Box should be marked.
10. Attention is drawn to rules 90 and 105 of the Patent Rules. Where there are more than 3 applicants, see also Note 2 above.
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Method and apparatus for deflashing of integrated circuit packages.

5 This invention relates to a method and apparatus for laser deflashing of integrated circuit (IC) packages. In particular, it relates to a method and apparatus for removing flash from heat sinks as well as leads and bars in IC packages without damage.

10 A plastic-encapsulated microcircuit consists of an IC chip physically attached to a leadframe, electrically interconnected to input-output leads and moulded in a plastic that is in direct contact with the chip, leadframe, and interconnects. With major advantages in cost, size, weight, performance, and availability, plastic packages have attracted 97% of the market share of worldwide microcircuit sales.

15 During the moulding process, it is known that moulding compound can flow through the mould parting line and onto the leads of the device. In its thinnest form, this material is known as resin bleed or thin flash. A thicker bleed of material is known as flash. If this material is left on the leads it will cause problems in the downstream operations of lead trimming, forming, and solder dipping and/or plating. In some cases, plastic packages are designed with an integral heat spreader exposed to air to meet high thermal and electrical performance demands. The die is attached directly to the heat spreader to minimize the thermal resistance. During the moulding process, moulding compound usually leaks out and forms flash on heat sink surfaces. This will greatly limit heat sink function and even cause damage of the plastic packages. Therefore, deflashing of IC packages is one of critical processes in the manufacturing.

25 Mechanical and chemical deflashing are conventional deflashing techniques in IC packaging lines. For removing resin bleed or thin flash, it is excellent to use chemical deflashing technique. Plastic packages are immersed in a chemical tank for a specified time and checked for the degree of deflashing. Effectively deflashed components are rinsed and air-dried. However, it has distinct drawbacks. First, chemical solution used for deflashing can potentially hurt component performance. Second, there is the

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significant cost of handling and disposing toxic materials during and after deflashing. Mechanical deflashing techniques such as suction gun, pressure gun, wet blast and impeller wheel are usually used to remove flash on round leads, heat sinks and lead frames, and flash between tie bars and leads. However, it also has distinct drawbacks as shown in R. F. Zecker "Deflashing encapsulated electronic components"; *Plastics Engineering*, June (1985), pp. 35-38. For example, some dust is needed to clean up.

Laser deflashing as a new deflashing technique was disclosed in US patents Nos. 5099101 and 5961860, and Singapore patent WO 00/37209. In above patents, YAG laser or excimer laser is used to remove flash. Since heat sinks as well as leads and bars are made of copper or copper substrate with metal coating layers, YAG laser or excimer laser easily induces damage of heat sinks as well as leads and bars in air at high laser fluence. Our new findings indicate that as flash especially thick flash has been removed by YAG or excimer laser ablation, the laser also induces damage such as oxidation of heat sinks as well as leads and bars. In fact, only thin flash can be removed by YAG or excimer laser deflashing at low laser fluence and pulse number without damage such as oxidation of heat sinks as well as leads and bars. Therefore, how to remove flash without damage is key issue for laser deflashing application in industry

In accordance with a first aspect of the present invention there is provided a method of deflashing IC packages. The method comprises the steps of directing a first laser beam in the infra-red frequency range onto flash area for removing top layer of flash; and subsequently directing a second pulsed laser beam onto the flash area at low laser fluence and pulse number for removing the thin layer of flash remained after application of the first laser beam.

Since heat sinks as well as leads and bars are high reflective materials to infra-red radiation, the first laser irradiation only induces low temperature rise of the heat sinks, leads and bars. In addition, the thin layer of flash remained after the first laser deflashing plays an important part in avoiding damage such as oxidation. Therefore, the damage can be effectively avoided during the first laser deflashing. when infra-red laser irradiates the flash area. The first laser can effectively remove top layer of flash especially thick flash. However, a thin layer of flash remains on heat sinks as well as

leads and bars after the first laser deflashing. That means that the first laser deflashing on its own cannot meet industrial demands. To complete effective deflashing, the second laser is applied deflashing at low laser fluence and pulse number can effectively remove the thin flash remained after the first laser deflashing without damage in accordance with this invention.

The first laser may, for example, be a CO₂ laser. It may be applied in pulses, each with a typical duration in excess of 1 μ s. Alternatively, it may be applied in a continuous wave (CW) mode.

The second laser may operate over a wide spectral range, for example, from infra-red to ultra-violet. It may suitably be a YAG laser. The second laser is, most preferably, applied in short-duration pulses. It has been found that a pulse length of less than 100ns is to be preferred to produce effective deflashing, without causing a significant and detrimental temperature rise in sensitive components, such as leads and bars, of the IC at low laser fluence and pulse number.

In accordance with a second aspect of the present invention, there is provided an apparatus for deflashing IC packages comprising: a conveyor system for carrying IC packages to appropriate position; a mask placed on IC packages for exposing flash area to laser beams; first and second lasers for generating laser beams; and a scanning system for each laser; wherein the belt conveyor is movable relative to each laser beam, the two galvanometers being used to scan respective laser beams in turn on a flash area of the IC packages.

With the present invention, the damage of heat sinks as well as leads and bars can be effectively avoided; the flash on heat sinks as well as leads and bars can be effectively removed by laser irradiation.

Apparatus embodying the invention may further comprise an exhauster for removing flash debris.

The first laser may be a CO₂ laser. Moreover, the first laser may be a pulsed laser or a continuous wave laser.

The second laser is typically a YAG laser. The second laser may have a wavelength of 1064 nm or 532 nm.

In typical embodiments, the second laser has predetermined pulse-duration. For example, the predetermined pulse duration is between 1 fs and 1000 ns; e.g. 7 ns.

- 5 Embodiments of the invention will now be described in detail, by way of example, and with reference to the accompanying drawings, in which:

Figure 1 is a schematic diagram showing the apparatus according to one embodiment of the present invention;

- 10 Figure 2a is a microscope photo showing a sample of heat sink in an IC package deflashed by a prior deflashing method using YAG laser irradiation at 300 mJ/cm²;

Figure 2b is a microscope photo showing another part of the same sample deflashed by a prior deflashing method using YAG laser irradiation at 300 mJ/cm²;

Figure 3a is a microscope photo showing a sample of heat sink in an IC package deflashed by a prior deflashing method using YAG laser irradiation at 720 mJ/cm²;

- 15 Figure 3b is an X-ray photoelectron spectroscopy (XPS) Cu2p spectrum of Fig. 3a;

Figure 4a is a microscope photo showing a sample of heat sink in an IC package deflashed by the method of the present invention using CO₂ and YAG laser deflashing.

Figure 4b is an X-ray photoelectron spectroscopy (XPS) Cu2p spectrum of Fig. 4a;

- 20 Figure 5a is a microscope photo showing a sample of heat sink in an IC package deflashed by the method of the present invention using CO₂ laser deflashing;

Figure 5b is a microscope photo showing the same sample of Fig 5a deflashed by the method of the present invention using YAG laser deflashing; and

Figure 5c is an X-ray photoelectron spectroscopy (XPS) Cu2p spectrum of Fig. 5b.

- 25 Refer now to Figure 1. The apparatus for deflashing IC packages according to one embodiment of the present invention comprises a first laser 10. The first laser is a CO₂

laser that generates a laser beam 20 in the infra-red range. in this embodiment, with a wavelength of approximately 10.6 μm .

A galvanometer 30 for first laser 10 is used to scan the CO_2 laser beam 20 onto an IC package 40 along a predetermined path. A mask 50 is used to expose only the flash area on the IC package 40 to laser beam 20. The IC package 40 with the mask 50 is placed on belt conveyor subsystem 60. After the first laser deflashing, the IC package 40 is carried from position A to position B by the belt conveyor subsystem 60 for following a second laser deflashing operation. Meanwhile, another IC package can be carried to position A for its first laser deflashing.

A second laser 70 is in this embodiment, a YAG laser for generating a YAG laser beam 80 having a wavelength of 532 nm or 1064nm. A galvanometer 90 for the second laser 70 is used to scan the YAG laser beam 80 onto the IC package 40 as it passes along its predetermined path.

An exhauster 100 is used to take away flash debris removed by CO_2 and YAG laser deflashing. A gas blower 110 is also provided to reduce heating of the IC packages by blowing gas, such as compressed air or N_2 gas through a nozzle onto the packages.

As shown in Figures 2a and 2b, one sample of heat sink was deflashed according to a prior art laser deflashing method. A YAG laser was used with a wavelength of 532 nm. The pulse duration is 7 ns. The laser fluence was 300 mJ/cm^2 and pulse number is 4. At an irradiated area 210, fresh heat sink surface can be seen. A thin layer of flash exists at non-irradiated area 220 as shown in Figure 2a. This indicates that thin flash can be easily removed by YAG laser deflashing. However, a thick layer of flash at irradiated area 230 in Figure 2b cannot be removed by YAG laser deflashing at 300 mJ/cm^2 and 4 pulses.

Figure 3a is a microscope photo showing an sample of heat sink in an IC package deflashed by a prior art deflashing method using YAG laser irradiation at 720 mJ/cm^2 and 10 pulses. Although thick flash in area 250 has been removed, damage to the heat sink surface has taken place. Figure 3b is an X-ray photoelectron spectroscopy (XPS) $\text{Cu}2\text{p}$ spectrum of the same sample of Figures 3a and 3b a after YAG laser deflashing at

a wavelength of 532 nm, a laser fluence of 720 mJ/cm² and a pulse number of 10. Four peaks are observed in the XPS Cu2p spectrum as shown in Figure 3b. This indicates that damage such as oxidation of heat sink has taken place. Comparing Figures 2 and 3, we can conclude that a YAG laser can only remove thin flash without damage at low
 5 laser fluence and pulse number. A YAG laser cannot remove thick flash without damage. The same effect was observed after deflashing using an excimer laser.

Figure 4a is a microscope photo showing a sample of heat sink in an IC package deflashed by the method of the present invention in apparatus described with reference to Figure 1. A first laser deflashing operation was carried out using the first laser 10 at
 10 a power of 10 W, pulse duration of 20 μ s, a repetition rate of 2000 Hz and a scan speed of 5 mm/s. Subsequently, a second deflashing operation was performed using a the YAG laser 70 at a wavelength of 532 nm, a laser fluence of 300 mJ/cm² and a pulse number of 4. As shown in Figure 4a, flash in area 260 has been removed by the method of the present invention without damage. Figure 4b is an XPS Cu2p spectrum of the
 15 same sample of Figure 4a. Comparing the XPS Cu2p spectrum of the heat sink with the standard XPS spectra of Cu2p observed in copper, cuprous oxide and cupric oxide, it was found that the XPS Cu2p spectrum of the heat sink is the same as the standard XPS Cu2p spectrum of copper. Therefore, no damage such as oxidation of the heat sink surface has taken place by the deflashing operation embodying the invention.

20 Figure 5a is a microscope photo showing a sample at heat sink in an IC package deflashed by the method embodying the present invention using CO₂ laser deflashing. The heat sink is made of copper. The pulse duration is 20 μ s and the repetition rate is 2000 Hz. The power is 10 W and scan speed is 5 mm/s. It is found that top layer of flash in area 270 has been removed and a thin layer of flash still exists on the heat sink
 25 surface. Figure 5b is a microscope photo showing the same sample of Figure 5a deflashed by the method of the present invention using YAG laser deflashing. The laser fluence is 400 mJ/cm² and pulse number is 2. The laser wavelength is 1064nm and pulse duration is 7ns. It was observed that the thin flash remained on the heat sink after CO₂ laser deflashing has been removed without damage as shown in area 280 of Figure
 30 5b. Figure 5c is an XPS Cu2p spectrum of the same sample of Figure 5b. Comparing the XPS Cu2p spectrum of the heat sink surface with standard XPS spectra of Cu2p

observed in copper, cuprous oxide and cupric oxide, it was found that XPS Cu2p spectrum of the heat sink surface is the same with standard XPS Cu2p spectrum of copper. Therefore, no damage such as on oxidation of the heat sink surface has taken place. Therefore, the present invention can be used to effectively remove thin or thick
5 flash without damage.

The present invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The presently disclosed embodiments are therefore, to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims and all changes which come
10 within the meaning and range of equivalency of the claims are therefore to be embraced therein.

Claims:

1. A method of deflashing IC packages comprising the steps of:
 - 5 directing a first laser beam in the infra-red frequency range onto flash area
for removing top layer of flash; and subsequently
 - directing a second pulsed laser beam onto the flash area at low laser fluence
and pulse number for removing the thin layer of flash remained after application
of the first laser beam.
- 10 2. A method according to claim 1, wherein the first laser is a CO₂ laser.
3. A method according to claim 1 or claim 2 in which the first laser beam has a
wavelength of approximately 1064 nm.
4. A method according to any preceding claim in which the first laser is operated in
pulses of length in excess of 1 μ s.
- 15 5. A method according to claim 4 in which the first laser is operated in continuous
wave mode.
6. A method according to any preceding claim in which the first laser has an
intensity of approximately 10kw/cm².
7. A method according to any preceding claim in which the second laser is a YAG
20 laser.
8. A method according to claim 7 in which the second laser has a wavelength that
is between ultra-violet and infra-red.
9. A method according to claim 8 in which the second laser has a wavelength of
approximately 532 nm or 1064nm.

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10. A method according to any preceding claim in which the second laser is operated in pulses.
11. A method according to claim 10 in which the pulse duration is between one fs and 1000 ns.
- 5 12. A method according to claim 11 in which the pulses are of duration not greater than 100ns.
13. A method according to any preceding claim in which the second laser has a fluence of less than 1000 mJ/cm².
- 10 14. A method according to claim 13 in which the second laser has a fluence of approximately 300 mJ/cm².
15. An apparatus for deflashing IC packages comprising:
- a. a conveyor system for carrying IC packages to appropriate position;
 - b. a mask placed on IC packages for exposing flash area to laser beams;
 - c. first and second lasers for generating laser beams; and
 - 15 d. a scanning system for each laser;
- wherein the conveyor is movable relative to each laser beam, the two galvanometers being used to scan respective laser beams in turn on a flash area of the IC packages.
- 20 16. Apparatus according to claim 15 further comprising an exhauster for removing flash debris.
17. Apparatus according to claim 15 or claim 16 in which the first laser is a CO₂ laser.
18. Apparatus according to any one of claims 15 to 17 in which the first laser is a pulsed laser.

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19. Apparatus according to any one of claims 15 to 17 in which the first laser is a continuous wave laser.
20. Apparatus according to any one of claims 15 to 19 in which the second laser is a YAG laser.
- 5 21. Apparatus according to any one of claims 15 to 20 in which the second laser has a wavelength of 1064 nm or 532 nm.
22. Apparatus according to any one of claims 15 to 21 in which the second laser has predetermined pulse-duration.
23. Apparatus according to claim 22 in which the predetermined pulse duration is
10 between 1 fs and 1000 ns.
24. A method of deflashing integrated circuit packages substantially as herein described with reference to the accompanying drawings.
25. An apparatus for deflashing IC packages substantially as herein described with reference to the accompanying drawings.

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Abstract**Method and apparatus for deflashing of integrated circuit packages.**

5

This invention relates to a method and apparatus for deflashing integrated circuit (IC) packages by laser irradiation. The method and apparatus include two lasers scanning flash area for performing deflashing operation. CO₂ laser is used to remove top layer of flash and YAG laser is used to remove the thin layer of flash remained after CO₂ laser deflashing. CO₂ laser deflashing and following YAG laser deflashing can effectively remove flash and avoid damage of heat sinks as well as leads and bars in the IC packages.

10

Fig. 1

JUN 15 2006

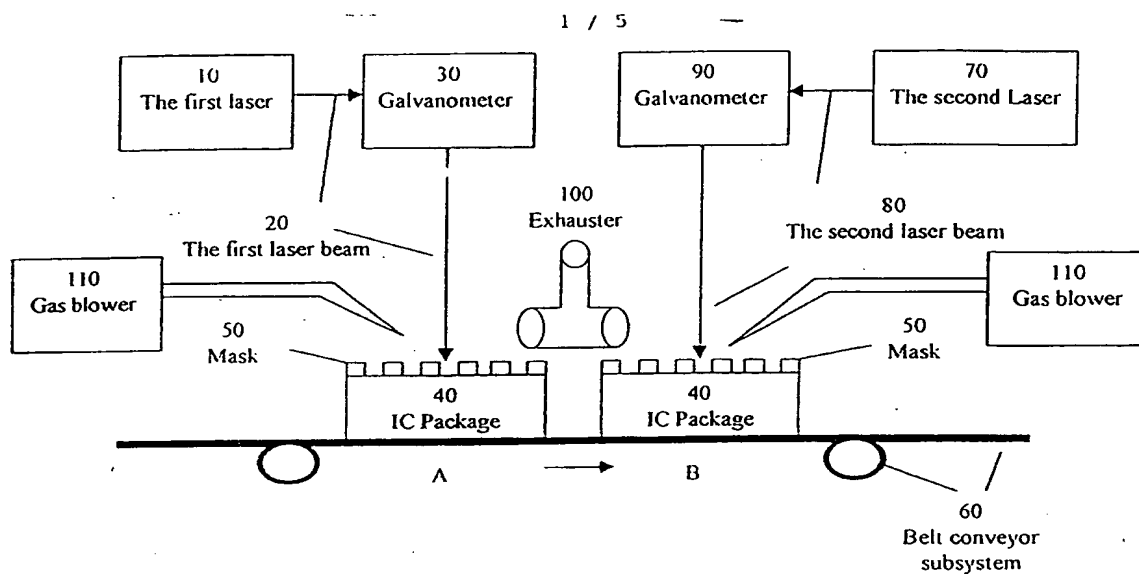


Fig. 1

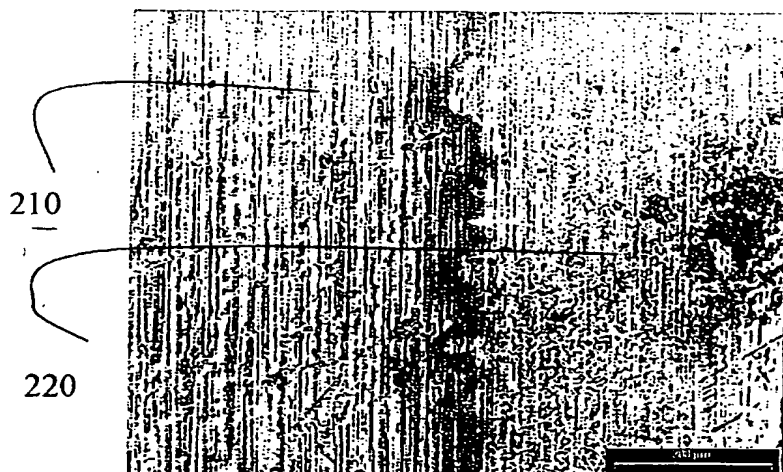


Fig. 2a



Fig. 2b

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250

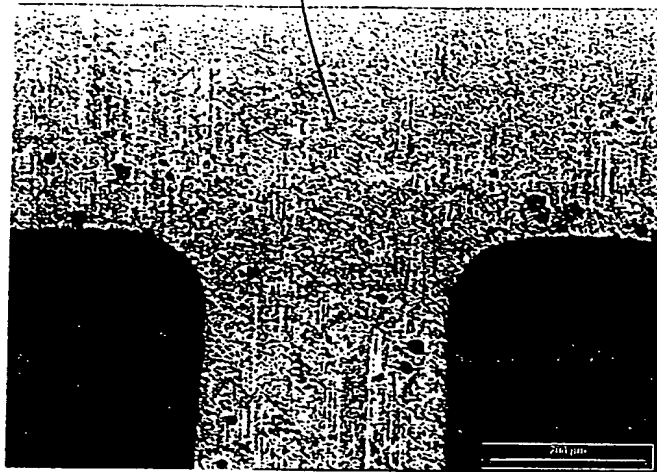


Fig. 3a

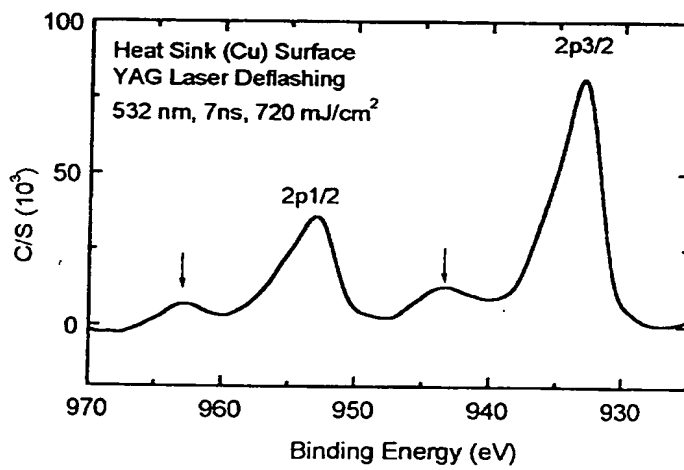


Fig. 3b

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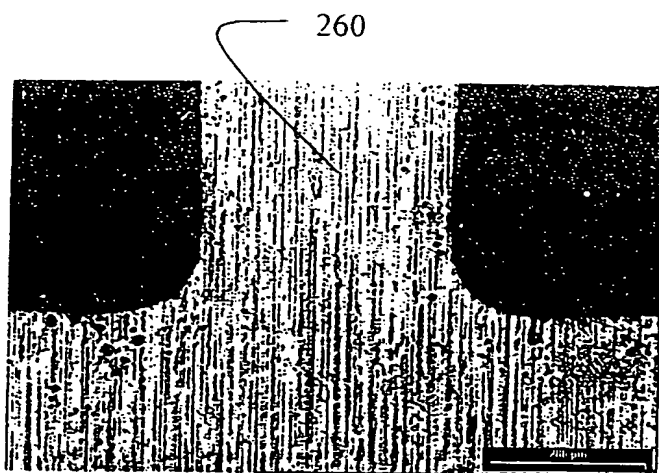


Fig. 4a

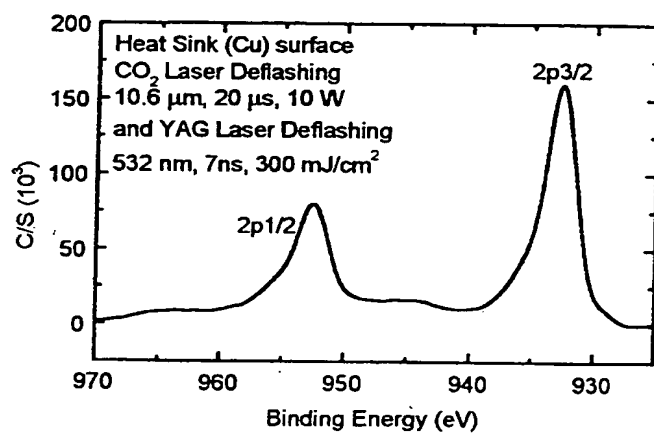


Fig. 4b

5 / 5

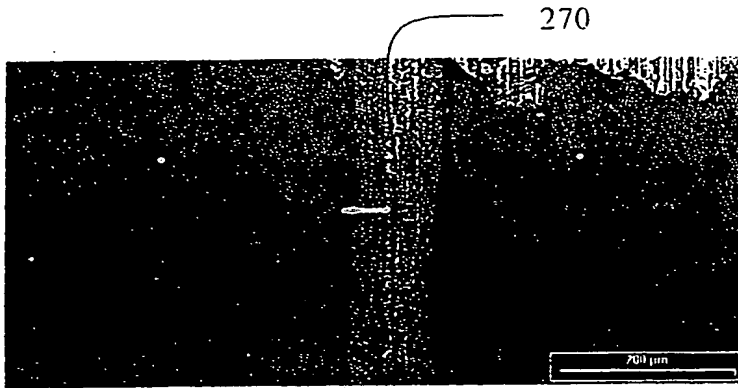


Fig. 5a



Fig. 5b

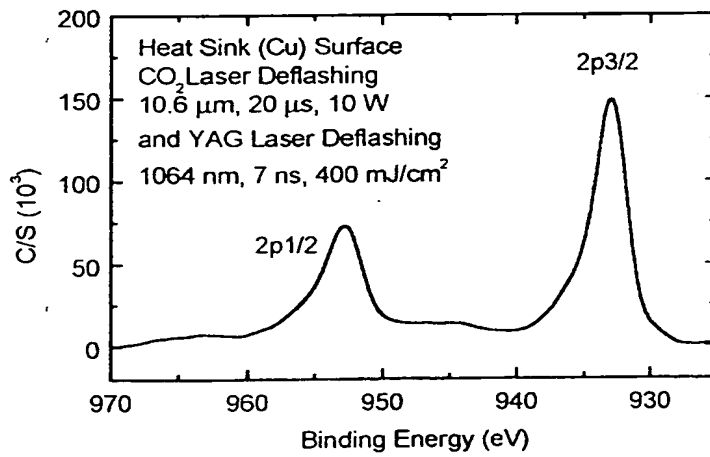


Fig. 5c

EXHIBIT E

JUN 15 2006

I hereby claim the benefit under Title 35, United States Code, Section 119(e) of any United States provisional application(s) listed below:

| <u>Provisional Application No.</u> | <u>Filing Date</u> | <u>Status</u> |
|------------------------------------|--------------------|---------------|
| N/A | | |
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| <u>Application Serial No.</u> | <u>Filing Date</u> | <u>Status</u> |
|-------------------------------|--------------------|---------------|
| N/A | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

And I hereby appoint

John P. White (Reg. No. 28,678); Christopher C. Dunham (Reg. No. 22,031); Norman H. Zivin (Reg. No. 25,385); Jay H. Maioli (Reg. No. 27,213); William E. Pelton (Reg. No. 25,702); Robert D. Katz (Reg. No. 30,141); Peter J. Phillips (Reg. No. 29,691); Wendy E. Miller (Reg. No. 35,615); Richard S. Milner (Reg. No. 33,970); Robert T. Maldonado (Reg. No. 38,232); Paul Teng (Reg. No. 40,837); Richard F. Jaworshi (Reg. No. 33,515); Pedro C. Fernandez (Reg. No. 41,741); Gary J. Gershik (Reg. No. 39,992); Spencer H. Schneider (Reg. No. 45,923); Alan J. Morrison (Reg. No. 37,399); Alan D. Miller (Reg. No. 42,889) and Frank Bruno (Reg. No. 46,583)

and each of them, all c/o Cooper & Dunham LLP of 1185 Avenue of the Americas, New York, New York 10036, my attorneys, each with full power of substitution and revocation, to prosecute this application, to make alterations and amendments therein, to receive the patent, to transact all business in the Patent and Trademark Office connected therewith and to file any International Applications which are based thereon under the provisions of the Patent Cooperation Treaty.

Please address all communications, and direct all telephone calls, regarding this application to

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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EXHIBIT F



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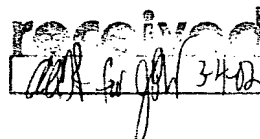
| APPLICATION NUMBER | FILING DATE | GRP ART UNIT | FIL FEE REC'D | ATTY-DOCKET NO | DRAWINGS | TOT CLAIMS | IND CLAIMS |
|--------------------|--------------|--------------|---------------|----------------|----------|------------|------------|
| 10/059,940 ✓ | 01/29/2002 ✓ | 1725 | 615 | 66307JPW/MS | 5 | 25 | 4 |

CONFIRMATION NO. 7142

FILING RECEIPT



OC000000007529923



Date Mailed: 02/25/2002

John P. White
Cooper & Dunham LLP
1185 Avenue of the Americas
New York, NY 10036

MAR 1 - 2002

W.D.

Receipt is acknowledged of this nonprovisional Patent Application. It will be considered in its order and you will be notified as to the results of the examination. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please write to the Office of Initial Patent Examination's Customer Service Center. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections (if appropriate).

Applicant(s)

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Yong Feng Lu, Singapore, SINGAPORE;

Assignment For Published Patent Application

Data Storage Institute;

Domestic Priority data as claimed by applicant

Foreign Applications

SINGAPORE 200106032-6 10/01/2001

If Required, Foreign Filing License Granted 02/25/2002

Projected Publication Date: 04/03/2003

Non-Publication Request: No

Early Publication Request: No

** SMALL ENTITY **

Title

JUN 5 2006

Patentee : Wen Dong Song et al.
U.S. Patent No. : 6,838,637 B2
Issued : January 4, 2005

Exhibit F

Method and apparatus for deflashing of integrated circuit packages

Preliminary Class

219

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